

pearance of any outer lobe or expansion of the animal covering the outside of the shell, as in *Amphipeplea glutinosa*. The mantle in *Limnæa involuta* is not developed to any greater extent than in other allied species, such as *L. peregra* and *L. auricularia*; and the external surface of the shell remains at all times uncovered, whether the animal is expanded or not.

*Description*.—Body olive-brown shading in the centre into slaty grey, and mottled with darker colour inside the shell. Tentacles broadly triangular. Eyes nearly sessile. Foot broad, oblong, rounded and slightly emarginate in front, narrowed behind into a shortish tail.

Mr. W. H. Baily, of the Geological Survey of Ireland, has kindly made a drawing from the living animal, which has never previously been figured; and from our figure (magnified 2 diams.) it will be seen that the animal closely resembles that of *Limnæa* as drawn in plate iv. of the first volume of Gwyn Jeffreys's 'British Conchology,' except that the body of *Limnæa involuta* is rather narrower, and the tentacles broader at the base.

Glasnevin, May 25, 1869.

## VI.—On the Cestoid Worms of the Bustard.

By Dr. H. KRABBE\*.

[Plate III. figs. 4–13.]

A TAPEWORM which, from its peculiar appearance, long since attracted attention, and has been easy of recognition, is the *Tenia villosa* occurring in *Otis tarda*. It was described and figured by Bloch †, who gave it the above name on account of the fringed appearance of one of its margins, which is due to the fact that the posterior angle of one side of each joint is drawn out into a narrow process. In five bustards which he examined there were at least 500 in each, and in a young bird which had been reared in captivity he estimated the number of worms at about 1000. Bloch states the length to be 4 feet; and the number of joints should be, according to his calculation, at least 32,000, which, however, is probably about ten times the actual number.

At the same time it was treated of under the name of *Tenia*

\* Translated from the 'Videnskabelige Meddelelser fra Naturhistorisk Forening i Kjöbenhavn, for Aaret 1867,' pp. 122–126, by W. S. Dallas, F.L.S.

† Abhandl. von der Erzeugung der Eingeweidewürmer (Berlin, 1782), p. 12, tab. 2. figs. 5–9.

*Otidis* by Werner\*, who had obtained his specimens from Leske. He noticed the difficulty with which it is extricated, from the masses into which it readily twists itself together, and of which he gave a figure.

Rudolphi† also found it in great numbers in *Otis tarda* at Greifswald, and referred it to the *Tæniæ* with an unarmed proboscis. Bremser‡ and Nitzsch§ gave figures of it. Dujardin|| doubted whether it was destitute of hooks on the proboscis.

Of this tapeworm there are specimens from Abildgaard's time in the collection of the Agricultural College. I have also found it in great numbers in a bustard from Jylland, which died (in 1860) in Kjærbölling's Zoological Garden; and it seems in general to occur plentifully in this bird. On examining the head, I found on the retracted proboscis fourteen unidentate hooklets of 0·024–0·026 millim. in length, with a proportionally very long shaft. *Tænia stylosa*, *T. fringillarum*, and several hitherto undescribed species of tapeworms in *Scolopax rusticula* and *Cursorius isabellinus* have hooklets of a similar form. In the joints the oval strongly refractive organ (cirrus-vesicle?), which is also reproduced in Bloch's figures, is particularly striking. The generative organs were nowhere protruded; but the sexual orifices are undoubtedly uniserial, although not very large. No ova occurred.

Together with this tapeworm, Bloch found in *Otis tarda* a second species of *Tænia*, which he likewise figured. He called it *Tænia articulata conoideis*, and stated that he had found it in many kinds of birds, and others in several species of ducks. This, however, has no very prominent peculiarities, and might consequently be easily confounded with other tapeworms. Rudolphi referred it to *T. infundibuliformis*, Goeze, and likewise found it in bustards. But the worms in question, as preserved in the museum at Berlin, are, as I have had the opportunity of convincing myself, different from the *T. infundibuliformis* which occurs in the common fowl, and have uniserial sexual orifices, like *T. villosa*. As neither heads nor joints with ova were to be found, I am not at present in a position to give a more complete character of it. In

\* Vermium intestinalium, præsertim Tæniæ humanæ brevis expositio (Lipsiæ, 1782), p. 54, tab. 3. figs. 58–63.

† Entozoorum sive vermium intestinalium historia naturalis, vol. ii. part 2 (Amstelodami, 1810), p. 126.

‡ Icones Helminthum (Viennæ, 1824), tab. 15. figs. 9–13.

§ Schmalz, xix. tabulæ anatomiam Entozoorum illustrantes (Dresdæ et Lipsiæ, 1831), tab. 3. figs. 1–6.

|| Hist. Nat. des Helminthes (Paris, 1845), p. 603.

the Vienna catalogue \* it is stated that the tapeworm was found once in seven times in *Otis tarda*, and it is referred to *T. infundibuliformis*.

In the above-mentioned bustard from Kjærbølling's zoological garden there was, besides *T. villosa*, another in many respects very remarkable tapeworm, to the number of several hundreds. As it is not very different in breadth from *T. villosa*, I first observed it when, long after collecting it, I undertook a closer examination of the latter worm. It was 20–30 millims. in length. There was no head with the usual organs of adhesion, and I therefore thought at first that it had been lost. Probably, however, that is not the case, partly because there is no trace of lesion to be seen, and partly, which is of great importance, because in all specimens the anterior extremity behaves in the same peculiar fashion, having a very singular structure. The number of joints varied from thirty to rather more than one hundred; but the length of the tapeworm held no proportion to this number. The six or seven joints which constitute the anterior part present in all the same appearance: they are, like the rest, compressed; but both their posterior angles stand out at the sides as saddle-shaped membranous fingers, which are largest upon the middlemost of these joints, but become lost behind, the superior joints passing evenly into the following ones. In the middle region of the worm the male sexual apparatus was generally well developed; and along one margin the sexual organs showed themselves protruding upon a larger or smaller number (up to about twenty) of segments, most strongly upon the middlemost of these, whilst they were more or less retracted upon the foremost and hindmost of them. The sexual organ (the protruded spermatiduct) is cylindrical, comparatively large, namely 0.046 millim. in diameter, and as much as 0.5 millim. in length; its surface has a readily perceptible covering of fine spines, in regularly crossing rows. If the spermatiduct be traced into the joint, it is seen to bend backward and form a loop. From the sexual orifice an elongated oval sac extends forward. In the posterior part of the joint two pretty sharply defined roundish organs are observed, and between these a third, less considerable one. The joints now increase in size posteriorly; and in the posterior there were, in several of the worms, thinly membranous round ova, with hooked embryos of 0.014–0.016 millim. in length; these joints, which were more elongated, had a dilatation

\* Westrumb, De Helminthibus acanthocephalis. Commentatio historico-anatomica adnexo recensu animalium, in Museo Vindobonensi circa Helminthes dissectorum, et singularum specierum harum in illis reperatarum (Hanoveræ, 1821), p. 73.

upon one side or the other, in which especially the ova were collected.

A single younger specimen, of a little more than 10 millims. in length, in which there was not yet any trace of generative organs, furnished some elucidation of the mode of development of the joints. The anterior extremity of the worm presented the same characters as in the more developed specimens; it had exactly the same appearance, and was only a little smaller; but behind it the breadth diminished, so that the whole of the posterior region was very small, only 0·1 millim. broad, although already distinctly and throughout quite regularly divided into joints, the number of which amounted to about 110. Now, considering that the number of joints in the more developed worms was smaller in proportion as the development of the sexual apparatus and therewith the enlargement of the joints had advanced forwards, it would seem certain that the formation of all the joints takes place before the sexual organs begin their development, and that their development subsequently advances from behind forwards, whilst the posterior joints are successively thrown off as they reach maturity.

As this tapeworm cannot be referred to any known genus, I will propose to call it *Idiogenes Otidis*. I assume that the anterior region furnished with finger-like processes may be regarded as the head or scolex. The ova exactly resemble those which occur in several species of *Tenia*; but the mode of development of the joints differs from the usual mode.

If we examine Bremser's fig. 13, and Nitzsch's figs. 2, 3, 5, and 6, as cited, in which joints of *T. villosa* with protruded sexual organs and more or less distinct indications of the internal sexual apparatus are represented, the supposition will be forced upon us that a confusion of this tapeworm with *Idiogenes Otidis* may have taken place; and, with regard to Bremser's figure, it appears to me very probable that it belongs to *Idiogenes*. With regard to Nitzsch's figures, it might in such case be assumed that the generative apparatus of *Idiogenes* was drawn in the joint of *T. villosa*; at least I have never met with joints of *T. villosa* with sexual apparatus of this appearance. It is possible that Nitzsch might have been misled by Bremser's figure, and sought, by his somewhat diagrammatic figures, to bring about an agreement: and with regard to this, it may be remarked that it is difficult to obtain a complete and coherent specimen of *T. villosa*, in consequence of the interknotting which has already been referred to, and the facility with which they are broken up into fragments.

EXPLANATION OF PLATE III. figs. 4-13.

- Fig. 4.* Anterior part of *Tænia villosa*, with the head ( $\times 35$ ).  
*Fig. 5.* Circllet of hooks of the same ( $\times 240$ ).  
*Fig. 6.* Single hooks of the same ( $\times 920$ ).  
*Fig. 7.* Joints of the same ( $\times 35$ ).  
*Fig. 8.* Joints of "*Tænia infundibuliformis*," from *Otis tarda*, in Rudolphi's collection ( $\times 35$ ).  
*Fig. 9.* *Idiogenes Otidis* in a young stage ( $\times 9$ ).  
*Fig. 10.* The same, more advanced in development ( $\times 9$ ).  
*Fig. 11.* The anterior region of the same ( $\times 18$ ).  
*Fig. 12.* Joints of the same, with generative organs ( $\times 35$ ).  
*Fig. 13.* Ova of the same ( $\times 240$ ).

VII.—On the *Myology of Bradypus tridactylus*; with Remarks on the general Muscular Anatomy of the Edentata. By ALEXANDER MACALISTER, Demonstrator of Anatomy, Royal College of Surgeons, Ireland, Professor of Anatomy, Royal Dublin Society\*.

THE muscular anatomy of the Edentata is of particular interest when considered in connexion with the curious habits of many of the order, as well as when we consider it in connexion with the zoological affinities of the group; and attention has been directed of late to the subject by a number of papers by various anatomists. Through the kindness of Prof. Haughton, I have been enabled to make a very careful dissection of (1) a very fine young specimen of *Ai* (*Bradypus tridactylus*) and (2) four Armadilloes (*Dasyus sexcinctus*); and on these, with references to the notes of a former dissection of a Seven-banded Armadillo, I have founded the following remarks. The anatomy of the *Ai* has been made the subject of description by Süssmuhl†, Meckel‡, and Cuvier§, that of the Anteaters by Meckel||, Pouchet¶, Owen\*\*, and Rapp††; of *Orycteropus* by Cuvier, Humphry‡‡, and Galton §§; of Armadilloes by Cuvier, Meckel, and Galton. It may thus be seen how much has been hitherto done as regards the study of the myology of these animals. Most of these descriptions seem to be made

\* Communicated by the Author, having been read before the Royal Zoological Society of Ireland.

† De Musculis in extremitatibus Bradypodis tridactyli. Berol. 1815.

‡ System der Vergleichenden Anatomie, 1828.

§ Leçons d'Anat. Comparée, 1835.

|| Anat. des zweizehigen Ameisenfresser. Archiv, v. 1819.

¶ Mémoire sur le grand Fourmilier. Premier livraison. 1867.

\*\* On the Anatomy of the Great Anteater (Trans. Zool. Soc. 1854).

†† Anatomische Untersuchungen über die Edentaten. Tübingen, 1852.

‡‡ Journal of Anat. & Phys. ser. 2. vol. i. p. 290.

§§ Trans. Linn. Soc. vol. xxvi. p. 567.